MITSUBISHI ELECTRIC

700 series

INVERTER

F700

INSTALLATION GUIDELINE

FR-F720-00046 to 04750-NA

FR-F740-00023 to 12120-NA

Thank you for choosing this Mitsubishi Inverter.
Please read through this Installation Guideline and a CD-ROM enclosed to operate this inverter correctly.
Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
Please forward this Installation Guideline and the CD-ROM to the end user.

CONTENTS

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect the inverter until you have read through this Installation Guideline and appended documents carefully and can use the equipment correctly. Do not use the inverter until you have a full knowledge of the equipment, safety information and instructions. In this Installation Guideline, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠WARNING Incorrect handling may cause hazardous conditions, resulting in death or severe injury.

⚠CAUTION Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

The **⚠CAUTION** level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.

1. Electric Shock Prevention

⚠WARNING

- While power is on or when the inverter is running, do not open the front cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is off, do not remove the front cover except for wiring or periodic inspection.You may access the charged inverter circuits and get an electric shock.
- Before wiring, inspection or switching EMC filter ON/OFF connector, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring, inspection or switching EMC filter ON/OFF connector shall wait for at least 10 minutes after the power supply has been switched OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- This inverter must be grounded. Grounding must conform to the requirements of national and local safety regulations and electrical code (NEC section 250, IEC 536 class 1 and other applicable standards).
  A neutral-point grounded power supply for 400V class inverter in compliance with EN standard must be used.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The inverter must be installed before wiring. Otherwise you may get an electric shock or be injured.
- Setting dial and key operations must be performed with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.
- Do not replace the cooling fan while power is ON. It is dangerous to replace the cooling fan while power is ON.
- Do not touch the printed circuit board or handle the cables with wet hands. Otherwise you may get an electric shock.
- When measuring the main circuit capacitor capacity (*Pr. 259 Main circuit capacitor life measuring* = "1"), the DC voltage is applied to the motor for 1s at powering OFF. Never touch the motor terminal, etc. right after powering OFF to prevent an electric shock.

2. Fire Prevention

⚠CAUTION

- Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heatsink on the rear side, etc.). Mounting it to or near flammable material can cause a fire.
- If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current could cause a fire.
- Do not connect a resistor directly to the DC terminals P/+ and N/-. Doing so could cause a fire.

3. Injury Prevention

⚠CAUTION

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter since the inverter will be extremely hot. Doing so can cause burns.

4. Additional Instructions

Also the following points must be noted to prevent an accidental failure, injury, electric shock, etc.

(1) Transportation and installation

⚠CAUTION

- The product must be transported in correct method that corresponds to the weight. Failure to do so may lead to injuries.
- Do not stack the boxes containing inverters higher than the number recommended.
- The product must be installed to the position where withstands the weight of the product according to the information in the Instruction Manual.
- Do not install or operate the inverter if it is damaged or has parts missing. This can result in breakdowns.
- When carrying the inverter, do not hold it by the front cover or setting dial; it may fall off or fail.
- Do not stand or rest heavy objects on the product.
- The inverter mounting orientation must be correct.
- Foreign conductive bodies must be prevented to enter the inverter. That includes screws and metal fragments or other flammable substance such as oil.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- The inverter must be used under the following environment: Otherwise the inverter may be damaged.

Environment	Surrounding air temperature	LD	-10°C to +50°C(14°F to 122°F)(non-freezing)
		SLD (initial setting)	-10°C to +40°C (14°F to 104°F)(non-freezing)
	Ambient humidity		90% RH or less (non-condensing)
	Storage temperature		-20°C to +65°C *1 (-4°F to 149°F)
	Atmosphere		Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
	Altitude, vibration		Maximum 1000m (3280.80feet) above sea level for standard operation. After that derate by 3% for every extra 500m (1640.40feet) up to 2500m (8202feet) (92%) 5.9m/s^2 or less *2 at 10 to 55Hz (directions of X, Y, Z axes)

*1 Temperature applicable for a short time, e.g. in transit.
*2 2.9m/s^2 or less for the FR-F740-04320 or more.

(2) Wiring

⚠CAUTION

- Do not install a power factor correction capacitor or surge suppressor on the inverter output side. These devices on the inverter output side may be overheated or burn out.
- The connection orientation of the output cables U, V, W to the motor will affect the direction of rotation of the motor.

(3) Test operation and adjustment

⚠CAUTION

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

(4) Operation

⚠WARNING

- Any person must stay away from the equipment when the retry function is set as it will restart suddenly after trip.
- Since pressing STOP RESET key may not stop output depending on the function setting status, separate circuit and switch that make an emergency stop (power OFF, mechanical brake operation for emergency stop, etc.) must be provided.
- OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting inverter alarm with the start signal ON restarts the motor suddenly.
- The inverter must be used for three-phase induction motors.
  Connection of any other electrical equipment to the inverter output may damage the equipment.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. Doing so may lead to fault or damage of the inverter.

⚠CAUTION

- The electronic thermal relay function does not guarantee protection of the motor from overheating. It is recommended to install both an external thermal and PTC thermistor for overheat protection.
- Do not use a magnetic contactor on the inverter input for frequent starting/ stopping of the inverter.
- The effect of electromagnetic interference must be reduced by using a noise filter or by other means. Otherwise nearby electronic equipment may be affected.
- Appropriate measures must be taken to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/damage the power factor correction capacitor and generator.
- When driving a 400V class motor by the inverter, the motor must be an insulation-enhanced motor or measures must be taken to suppress surge voltage. Surge voltage attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- The inverter can be easily set for high-speed operation. Before changing its setting, the performances of the motor and machine must be fully examined.
- Stop status cannot be hold by the inverter's brake function. In addition to the inverter's brake function, a holding device must be installed to ensure safety.
- Before running an inverter which had been stored for a long period, inspection and test operation must be performed.
- For prevention of damage due to static electricity, nearby metal must be touched before touching this product to eliminate static electricity from your body.

(5) Emergency stop ⚠**CAUTION**

- A safety backup such as an emergency brake must be provided to prevent hazardous condition to the machine and equipment in case of inverter failure.
- When the breaker on the inverter input side trips, the wiring must be checked for fault (short circuit), and internal parts of the inverter for a damage, etc. The cause of the trip must be identified and removed before turning ON the power of the breaker.
- When any protective function is activated, appropriate corrective action must be taken, and the inverter must be reset before resuming operation.

(6) Maintenance, inspection and parts replacement

⚠CAUTION

- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter. It will cause a failure.

(7) Disposing of the inverter

⚠CAUTION

- The inverter must be treated as industrial waste.

General instructions

Many of the diagrams and drawings in Instruction Manuals show the inverter without a cover or partially open for explanation. Never operate the inverter in this manner. The cover must be always reinstalled and the instruction in Instruction Manuals must be followed when operating the inverter.

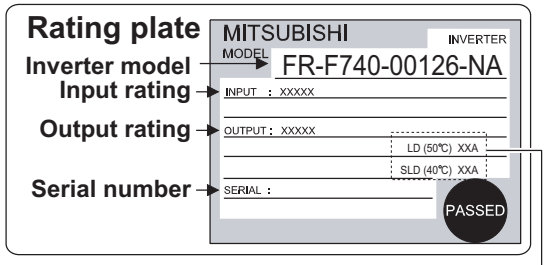
1 INSTALLATION OF THE INVERTER AND INSTRUCTIONS

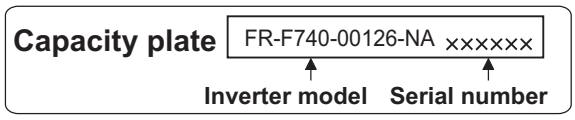
• Inverter Model

FR - F740 - 00126 - NA

Symbol	Voltage Class
F720	Three-phase 200V class
F740	Three-phase 400V class

Symbol	Model number
200V class 00046 to 04750	Represents the rated current.
400V class 00023 to 12120	





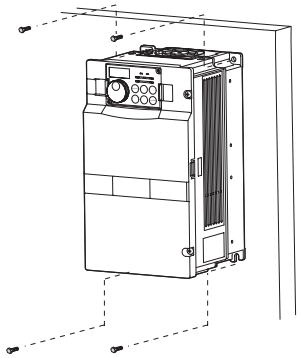
	Overload Current Rating	Surrounding Air Temperature
LD	120% 60s, 150% 3s	50°C(122°F)
SLD	110% 60s, 120% 3s	40°C(104°F)

• Installation of the inverter

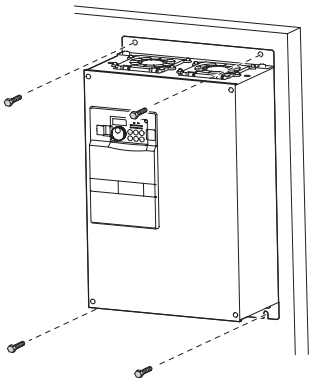
Note - Some inverter models may be installed outside an enclosure. See Appendix 2 for details.

Installation on the enclosure

FR-F720-01250 or less
FR-F740-00620 or less



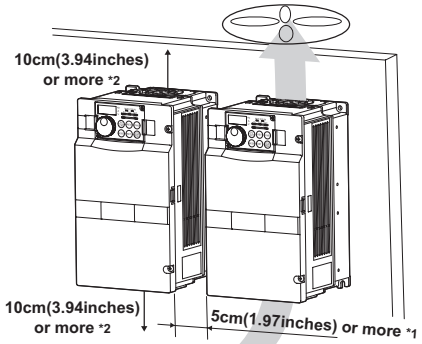
FR-F720-01540 or more
FR-F740-00770 or more



Fix six positions for the FR-F740-04320 to 08660 and fix eight positions for the FR-F740-09620 to 12120.

CAUTION

When encasing multiple inverters, install them in parallel as a cooling measure.



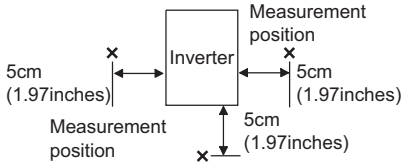
*1 1cm or more for FR-F720-00167 (FR-F740-00083) or less
10cm or more for FR-F720-03160 (FR-F740-01800) or more
*2 20cm or more for FR-F720-03160 (FR-F740-01800) or more

• General Precaution

The bus capacitor discharge time is 10 minutes. Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for residual voltage between terminal P/+ and N/- with a meter etc., to avoid a hazard of electrical shock.

• Environment

Before installation, check that the environment meets following specifications.

Surrounding Air Temperature	LD: -10°C to + 50°C (14°F to 122°F) Maximum (non-freezing) SLD (initial setting): -10°C to + 40°C (14°F to 104°F) Maximum (non-freezing) 
Ambient humidity	90%RH or less (non-condensing)
Storage temperature	-20°C to + 65°C (-4°F to 149°F)
Ambience	Indoors (No corrosive and flammable gases, oil mist, dust and dirt.)
Altitude, vibration	Below 1000m, 5.9m/s^2 or less at 10 to 55Hz (directions of X, Y, Z axes) (2.9m/s^2 or less for the FR-F740-04320 or more)

CAUTION

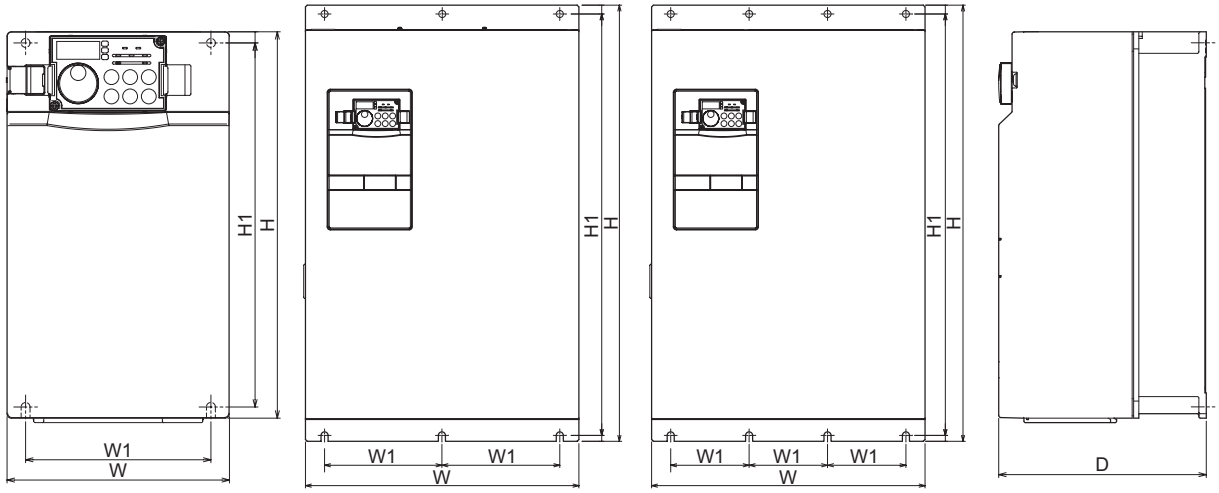
- Install the inverter on a non-combustible wall surface such as metal or concrete.
- Mount the inverter on a strong surface securely and vertically with bolts.
- Provide sufficient clearance distances away from other devices.
- WARNING: HEAT SINK SURFACE MAY BE HOT. TO REDUCE RISK OF BURN - DO NOT TOUCH.

2 OUTLINE DRAWING

FR-F720-00046 to 04750-NA
FR-F740-00023 to 03610-NA

FR-F740-04320 to 08660-NA

FR-F740-09620 to 12120-NA



(Unit:mm(inches))

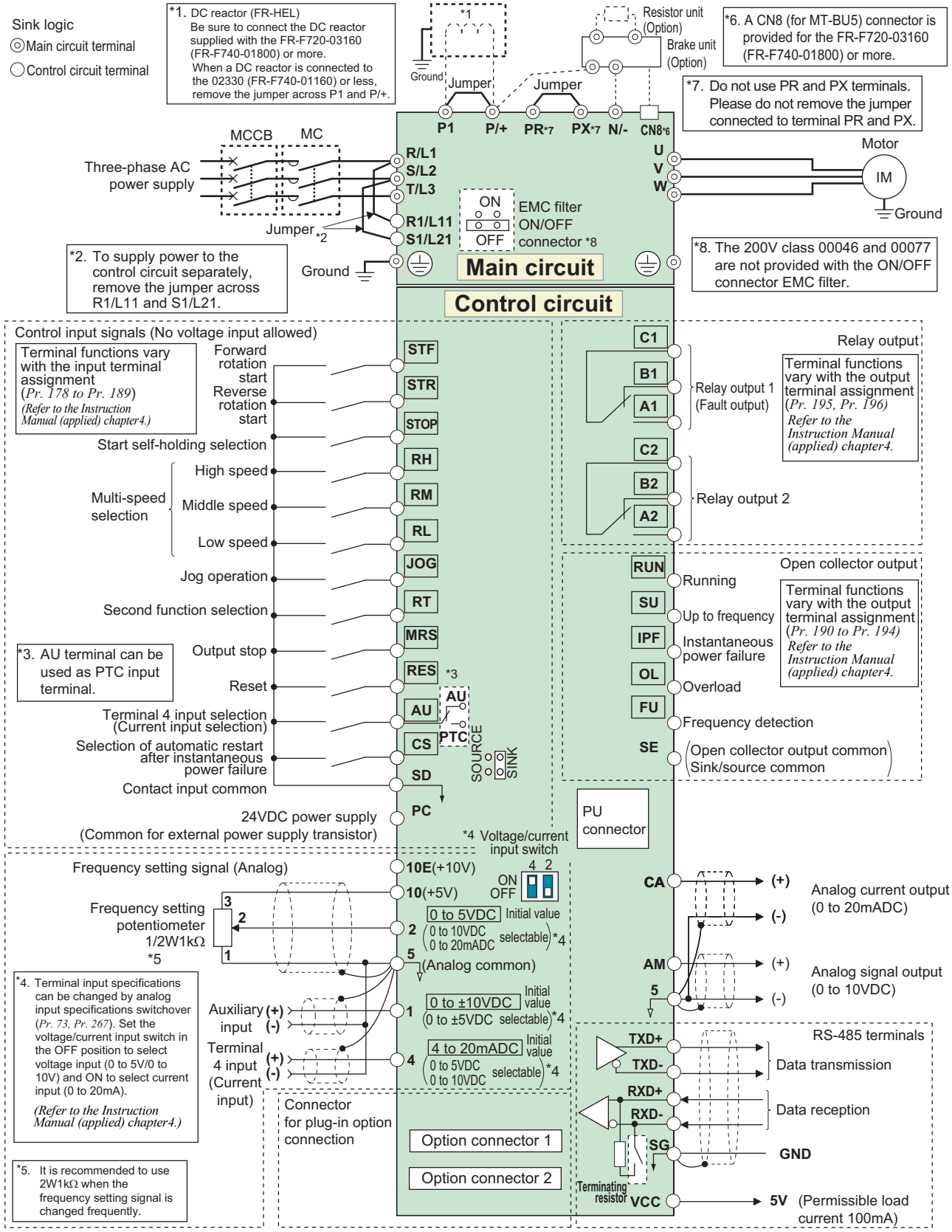
• 200V class

Inverter Model	W	W1	H	H1	D
FR-F720-00046-NA	110 (4.33)	95 (3.74)	260 (10.24)	245 (9.65)	110 (4.33)
FR-F720-00077-NA					125 (4.92)
FR-F720-00105-NA	150 (5.91)	125 (4.92)			140 (5.51)
FR-F720-00167-NA					
FR-F720-00250-NA					
FR-F720-00340-NA	220 (8.66)	195 (7.68)			170 (6.69)
FR-F720-00490-NA					
FR-F720-00630-NA			300 (11.81)	285 (11.22)	190 (7.48)
FR-F720-00770-NA	250 (9.84)	230 (9.06)	400 (15.75)	380 (14.96)	
FR-F720-00930-NA					
FR-F720-01250-NA					
FR-F720-01540-NA	325 (12.8)	270 (10.63)	550 (21.65)	530 (20.87)	195 (7.68)
FR-F720-01870-NA	435 (17.13)	380 (14.96)		525 (20.67)	250 (9.84)
FR-F720-02330-NA					
FR-F720-03160-NA	465 (18.31)	400 (15.75)	740 (29.13)	715 (28.15)	360 (14.17)
FR-F720-03800-NA					
FR-F720-04750-NA					

• 400V class

Inverter Model	W	W1	H	H1	D
FR-F740-00023-NA	150 (5.91)	125 (4.92)	260 (10.24)	245 (9.65)	140 (5.51)
FR-F740-00038-NA					
FR-F740-00052-NA					
FR-F740-00083-NA					
FR-F740-00126-NA					
FR-F740-00170-NA	220 (8.66)	195 (7.68)			170 (6.69)
FR-F740-00250-NA					
FR-F740-00310-NA			300 (11.81)	285 (11.22)	190 (7.48)
FR-F740-00380-NA					
FR-F740-00470-NA	250 (9.84)	230 (9.06)	400 (15.75)	380 (14.96)	190 (7.48)
FR-F740-00620-NA					
FR-F740-00770-NA	325 (12.8)	270 (10.63)	550 (21.65)	530 (20.87)	195 (7.68)
FR-F740-00930-NA	435 (17.13)	380 (14.96)	550 (21.65)	525 (20.67)	250 (9.84)
FR-F740-01160-NA					
FR-F740-01800-NA					
FR-F740-02160-NA	465 (18.31)	400 (15.75)	620 (24.41)	595 (23.43)	300 (11.81)
FR-F740-02600-NA					
FR-F740-03250-NA			740 (29.13)	715 (28.15)	360 (14.17)
FR-F740-03610-NA					
FR-F740-04320-NA	498 (19.6)	200 (7.87)	1010 (39.76)	984 (38.77)	380 (14.96)
FR-F740-04810-NA					
FR-F740-05470-NA	680 (26.77)	300 (11.81)			
FR-F740-06100-NA					
FR-F740-06830-NA					
FR-F740-07700-NA	790 (31.1)	315 (12.4)	1330 (52.36)	1300 (51.18)	440 (17.32)
FR-F740-08660-NA					
FR-F740-09620-NA	995 (39.17)	300 (11.81)	1580 (62.2)	1550 (61.02)	
FR-F740-10940-NA					
FR-F740-12120-NA					

3 WIRING



CAUTION

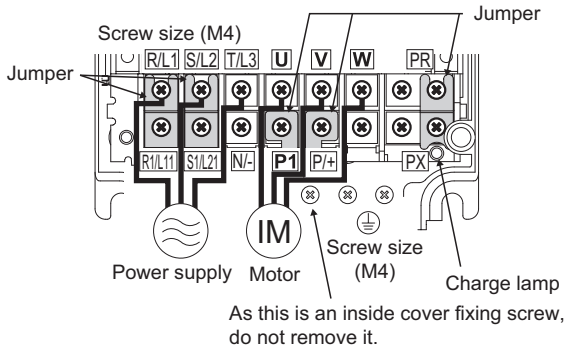
- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean.
  When drilling mounting holes in a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
- Set the voltage/current input switch correctly. Different setting may cause a fault, failure or malfunction.

3.1 Main circuit terminal

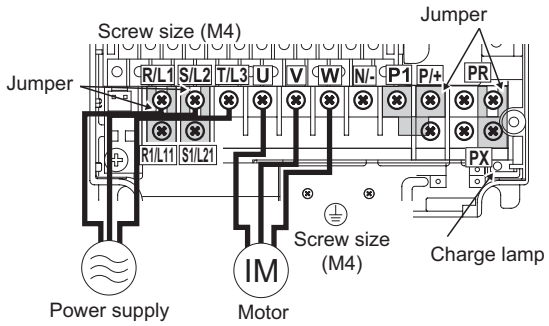
(1) Terminal layout and wiring

200V class

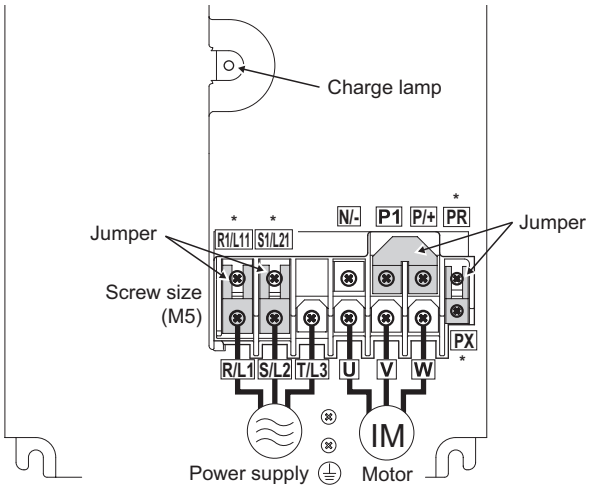
FR-F720-00046, 00077-NA



FR-F720-00105 to 00250-NA

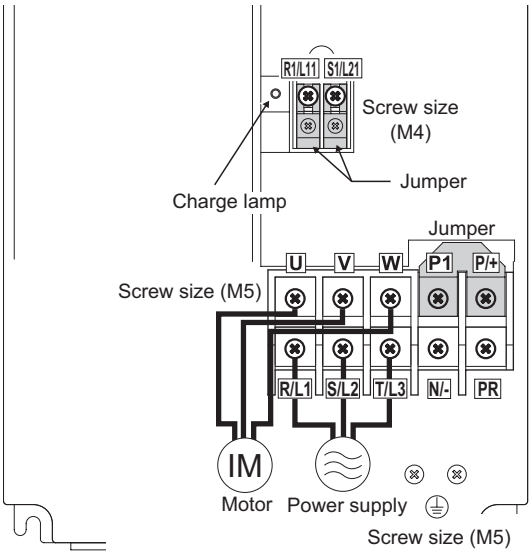


FR-F720-00340, 00490-NA

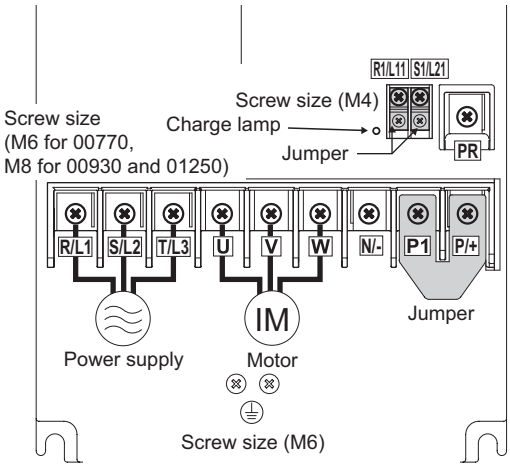


* Screw size of terminal R1/L11, S1/L21, PR and PX is M4.

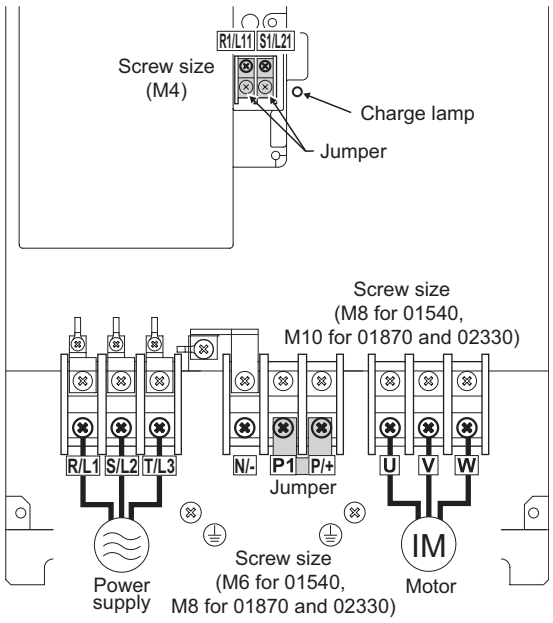
FR-F720-00630-NA



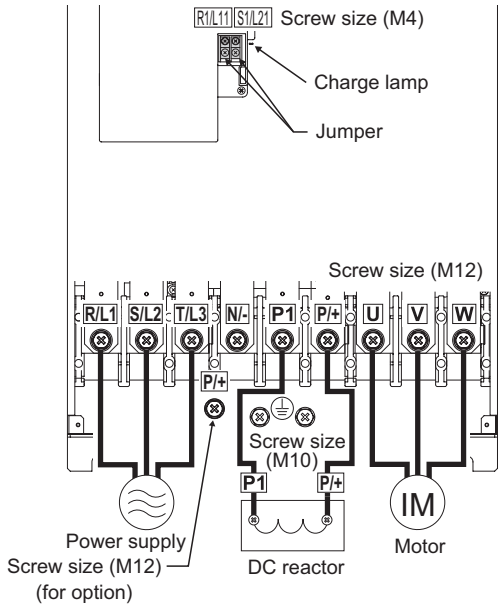
FR-F720-00770 to 01250-NA



FR-F720-01540 to 02330-NA

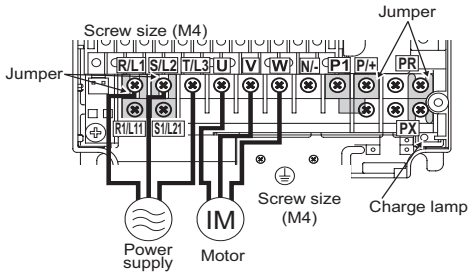


FR-F720-03160 to 04750-NA

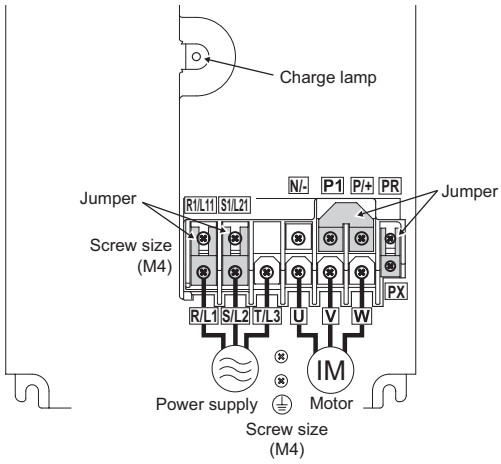


400V class

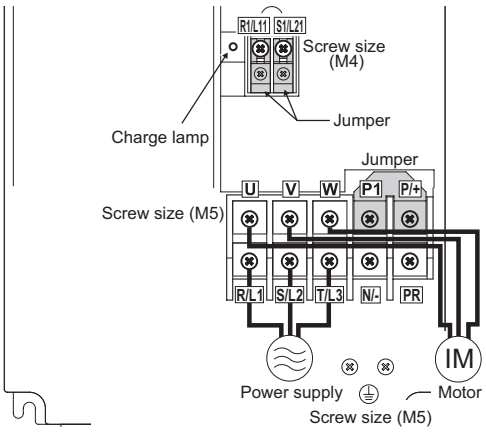
FR-F740-00023 to 00126-NA



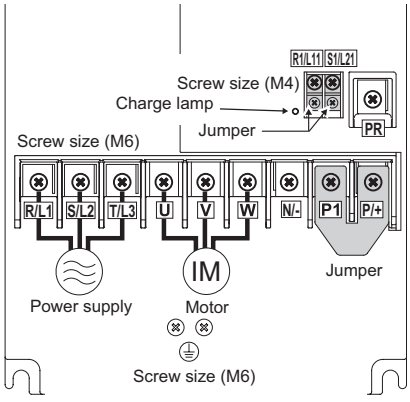
FR-F740-00170, 00250-NA



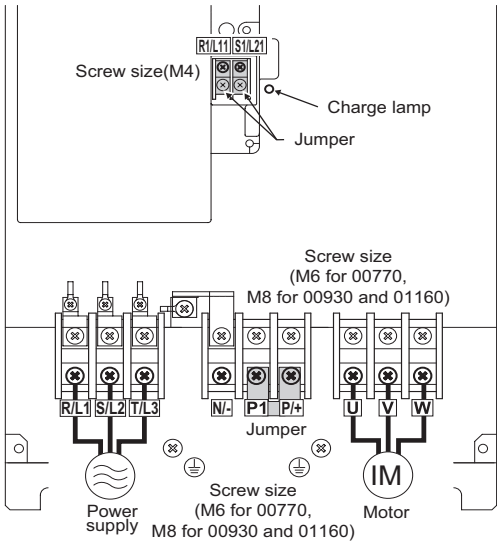
FR-F740-00310, 00380-NA



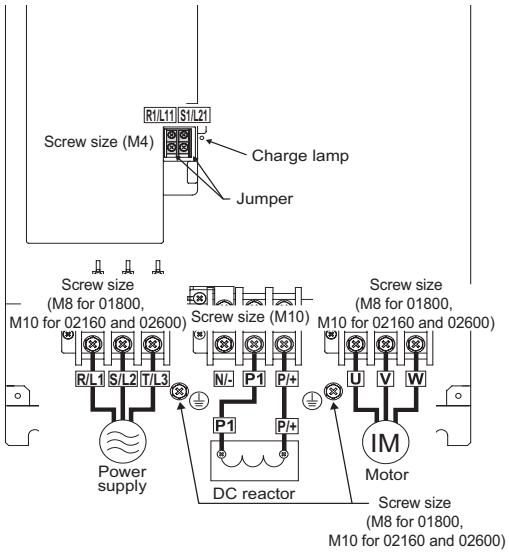
FR-F740-00470, 00620-NA



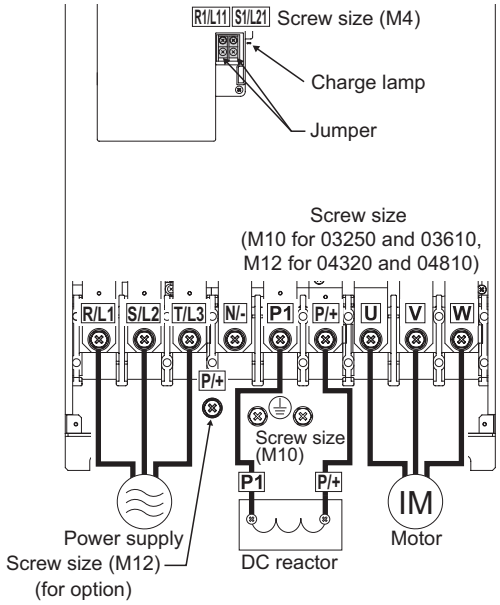
FR-F740-00770 to 01160-NA



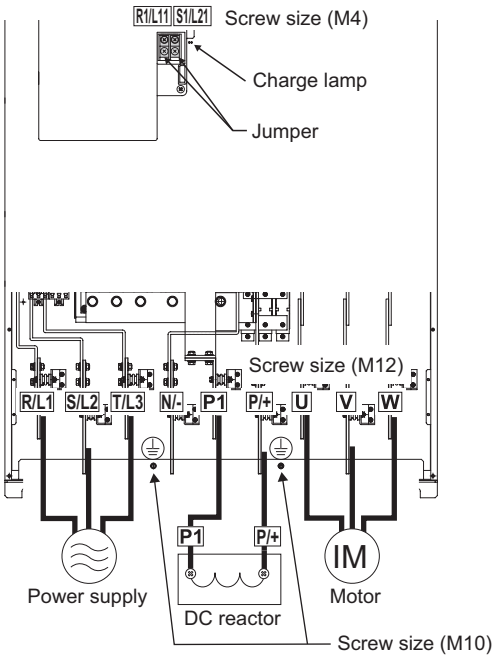
FR-F740-01800 to 02600-NA



FR-F740-03250 to 04810-NA

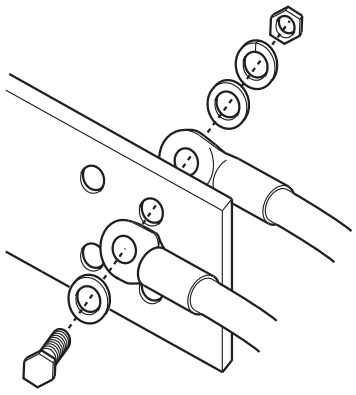


FR-F740-05470 to 12120-NA



CAUTION

- The power supply cables must be connected to R/L1, S/L2, T/L3. (Phase sequence needs not to be matched.) Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter.
- Connect the motor to U, V, W. At this time, turning ON the forward rotation switch (signal) rotates the motor in the counterclockwise direction when viewed from the motor shaft.
- When wiring the inverter main circuit conductor of the FR-F740-05470 or more, tighten a nut from the right side of the conductor. When wiring two wires, place wires on both sides of the conductor. (Refer to the drawing below.) For wiring, use bolts (nuts) provided with the inverter.



(2) Cable size

Select the recommended cable size to ensure that a voltage drop will be 2% or less.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.
The following table indicates a selection example for the wiring length of 20m (65.62feet).

200V class (when input power supply is 220V)

Applicable Inverter Model	Terminal Screw Size *4	Tightening Torque N·m	Crimping Terminal		Cable Sizes								
					HIV, etc. (mm²) *1				AWG/MCM *2		PVC, etc. (mm²) *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Ground cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Ground cable
FR-F720-00046 to 00105-NA	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
FR-F720-00167-NA	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
FR-F720-00250-NA	M4	1.5	5.5-4	5.5-4	5.5	5.5	5.5	5.5	10	10	6	6	6
FR-F720-00340-NA	M5	2.5	14-5	8-5	14	8	14	5.5	6	8	16	10	16
FR-F720-00490-NA	M5	2.5	14-5	14-5	14	14	14	14	6	6	16	16	16
FR-F720-00630-NA	M5	2.5	22-5	22-5	22	22	22	14	4	6 (*5)	25	25	16
FR-F720-00770-NA	M6	4.4	38-6	38-6	38	38	38	22	2	2	50	50	25
FR-F720-00930-NA	M8(M6)	7.8	38-8	38-8	38	38	38	22	2	2	50	50	25
FR-F720-01250-NA	M8(M6)	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
FR-F720-01540-NA	M8(M6)	7.8	80-8	80-8	80	80	80	22	3/0	3/0	70	70	35
FR-F720-01870-NA	M10(M8)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-F720-02330-NA	M10(M8)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-F720-03160-NA	M12(M10)	24.5	150-12	150-12	125	125	150	38	250	250	—	—	—
FR-F720-03800-NA	M12(M10)	24.5	150-12	150-12	150	150	2×100	38	2×4/0	2×4/0	—	—	—
FR-F720-04750-NA	M12(M10)	24.5	100-12	100-12	2×100	2×100	2×100	38	2×4/0	2×4/0	—	—	—

*1 The recommended cable size is that of the cable (e.g. HIV cable (600V class 2 vinyl-insulated cable)) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the ambient temperature is 50°C (122°F) or less and the wiring distance is 20m (65.62feet) or less.

*2 The recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the ambient temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
(Selection example for use mainly in the United States.)

*3 For the FR-F720-00930 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C (158°F). Assumes that the ambient temperature is 40°C (104°F) or less and the wiring distance is 20m(65.62feet) or less.
For the FR-F720-01250 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the ambient temperature is 40°C (104°F) or less and wiring is performed in an enclosure.
(Selection example for use mainly in Europe.)

*4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, and a screw for grounding.
A screw for earthing (grounding) of the FR-F720-00930 or more is indicated in ( ).

*5 When connecting the option unit to P/+, P1, N/-, use THHN cables for the option and terminals R/L1, S/L2, T/L3, U, V, W.

400V class (when input power supply is 440V based on the rated current for 110% overload for 1 minute)

Applicable Inverter Model	Terminal Screw Size *4	Tightening Torque N·m	Crimping (Compression) Terminal		Cable Sizes								
					HIV, etc. (mm2) *1				AWG/MCM *2		PVC, etc. (mm2) *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Ground cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Ground cable
FR-F740-00023 to 00083-NA	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
FR-F740-00126-NA	M4	1.5	2-4	2-4	2	2	3.5	3.5	12	14	2.5	2.5	4
FR-F740-00170-NA	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
FR-F740-00250-NA	M4	1.5	5.5-4	5.5-4	5.5	5.5	5.5	8	10	10	6	6	10
FR-F740-00310-NA	M5	2.5	8-5	8-5	8	8	8	8	8	8	10	10	10
FR-F740-00380-NA	M5	2.5	14-5	8-5	14	8	14	14	6	8	16	10	16
FR-F740-00470-NA	M6	4.4	14-6	14-6	14	14	22	14	6	6	16	16	16
FR-F740-00620-NA	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
FR-F740-00770-NA	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
FR-F740-00930-NA	M8	7.8	38-8	38-8	38	38	38	22	1	2	50	50	25
FR-F740-01160-NA	M8	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
FR-F740-01800-NA	M8	7.8	60-8	60-8	60	60	60	38	1/0	1/0	50	50	25
FR-F740-02160-NA	M10	14.7	100-10	100-10	80	80	80	38	3/0	3/0	70	70	35
FR-F740-02600-NA	M10	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-F740-03250-NA	M10	14.7	150-10	150-10	125	125	100	38	250	250	120	120	70
FR-F740-03610-NA	M10	14.7	150-10	150-10	150	150	150	38	300	300	150	150	95
FR-F740-04320-NA	M12(M10)	24.5	100-12	100-12	2×100	2×100	2×100	38	2×4/0	2×4/0	2×95	2×95	95
FR-F740-04810-NA	M12(M10)	24.5	100-12	100-12	2×100	2×100	2×100	38	2×4/0	2×4/0	2×95	2×95	95
FR-F740-05470-NA	M12(M10)	46	150-12	150-12	2×125	2×125	2×125	38	2×250	2×250	2×120	2×120	120
FR-F740-06100-NA	M12(M10)	46	150-12	150-12	2×150	2×150	2×125	60	2×300	2×300	2×150	2×150	150
FR-F740-06830-NA	M12(M10)	46	200-12	200-12	2×200	2×200	2×150	60	2×350	2×350	2×185	2×185	2×95
FR-F740-07700-NA	M12(M10)	46	C2-200	C2-200	2×200	2×200	2×200	60	2×400	2×400	2×185	2×185	2×95
FR-F740-08660-NA	M12(M10)	46	C2-250	C2-250	2×250	2×250	2×200	60	2×500	2×500	2×240	2×240	2×120
FR-F740-09620-NA	M12(M10)	46	C2-250	C2-250	2×250	2×250	2×250	100	2×500	2×500	2×240	2×240	2×120
FR-F740-10940-NA	M12(M10)	46	C2-200	C2-200	3×200	3×200	3×200	100	3×350	3×350	3×185	3×185	2×150
FR-F740-12120-NA	M12(M10)	46	C2-200	C2-200	3×200	3×200	3×200	100	3×400	3×400	3×185	3×185	2×150

*1 For the FR-F740-01160 or less, the recommended cable size is that of the cable (e.g. HIV cable (600V class 2 vinyl-insulated cable)) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the ambient temperature is 50°C (122°F) or less and the wiring distance is 20m (65.62feet) or less.
For the FR-F740-01800 or more, the recommended cable size is that of the cable (e.g. LMFC (heat resistant flexible cross-linked polyethylene insulated cable)) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the ambient temperature is 50°C (122°F) or less and wiring is performed in an enclosure.

*2 For the FR-F740-00930 or less, the recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the ambient temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
For the FR-F740-01160 or more, the recommended cable size is that of the cable (THHN cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the ambient temperature is 40°C (104°F) or less and wiring is performed in an enclosure.
(Selection example for use mainly in the United States.)

*3 For the FR-F740-00930 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C (158°F). Assumes that the ambient temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
For the FR-F740-01160 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the ambient temperature is 40°C (104°F) or less and wiring is performed in an enclosure.
(Selection example for use mainly in the Europe.)

*4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, and a screw for grounding.
A screw for earthing (grounding) of the FR-F740-04320 or more is indicated in ( ).

The line voltage drop can be calculated by the following formula:

$$\text{Line voltage drop [V]} = \frac{\sqrt{3} \times \text{wire resistance[m}\Omega\text{/m]} \times \text{wiring distance[m]} \times \text{current[A]}}{1000}$$

Use a larger diameter cable when the wiring distance is long or when it is desired to decrease the voltage drop (torque reduction) in the low speed range.

CAUTION

- Tighten the terminal screw to the specified torque.
  A screw that has been tighten too loosely can cause a short circuit or malfunction.
  A screw that has been tighten too tightly can cause a short circuit or malfunction due to the unit breakage.
- Use crimping terminals with insulation sleeve to wire the power supply and motor.

(3) Total wiring length

The overall wiring length for connection of a single motor or multiple motors should be within the value in the table below.

Pr. 72 PWM frequency selection setting (carrier frequency)	FR-F720-00046 FR-F740-00023	FR-F720-00077 FR-F740-00038	FR-F720-00105 or more FR-F740-00052 or more
2 (2kHz) or less	300m (984.25feet)	500m (1640.42feet)	500m (1640.42feet)
3 to 15 (3kHz to 14.5kHz)	200m (656.19feet)	300m (984.25feet)	500m (1640.42feet)

When driving a 400V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor. Take the following measures in this case.
Take the following measures (1) or (2) in this case.

(1) Use a "400V class inverter-driven insulation-enhanced motor" and set frequency in *Pr. 72 PWM frequency selection* according to wiring length.

	Wiring Length		
	50m (164.04feet) or less	50m (164.04feet) to 100m(328.08feet)	exceeding 100m (328.08feet)
Pr. 72 PWM frequency selection setting (carrier frequency)	14.5kHz or less	9kHz or less	4kHz or less

(2) Connect the surge voltage suppression filter (FR-ASF-H) to the FR-F720-02330 (FR-F740-01160) or less and the sine wave filter (MT-BSL/BSC) to the FR-F720-03160 (FR-F740-01800) or more on the inverter output side.

CAUTION

- Especially for long-distance wiring, the inverter may be affected by a charging current caused by the stray capacitances of the wiring, leading to a malfunction of the overcurrent protective function or fast response current limit function or a malfunction or fault of the equipment connected on the inverter output side. If fast-response current limit function malfunctions, disable this function. (For *Pr.156 Stall prevention operation selection, refer to the Instruction Manual (applied).*)
- For details of *Pr. 72 PWM frequency selection ,refer to the Instruction Manual (applied)*. When using an optional sine wave filter (MT-BSL/BSC) for the FR-F720-03160 (FR-F740-01800) or more, set “25” in *Pr.72* (2.5kHz).
  For explanation of surge voltage suppression filter (FR-ASF-H) and sine wave filter (MT-BSL/BSC), refer to the manual of each option.

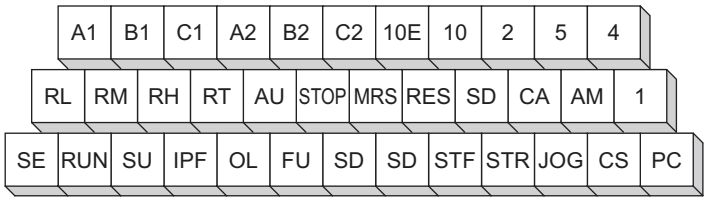
(4) Cable size of the control circuit power supply (terminal R1/L11, S1/L21)

· Terminal screw size: M4
· Cable size: 0.75mm^2 to 2mm^2
· Tightening torque: 1.5N·m

3.2 Control circuit terminals

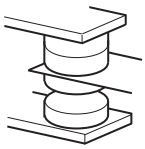
(1) Terminal layout

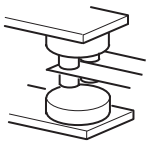
· Terminal Screw Size: M3.5
· Tightening torque: 1.2N·m



(2) Instructions for wiring of the control circuit terminal

1) Terminals 5, PC and SE are common to the I/O signals and isolated from each other. Do not ground.
2) It is recommended to use the cables of 0.75mm^2 gauge for connection to the control circuit terminals.
   If the cable gauge used is 1.25mm^2 or more, the front cover may be lifted when there are many cables running or the cables are run improperly, resulting in an operation panel contact fault.
3) The wiring length should be 30m (98.43feet) maximum.
4) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.


Micro signal contacts

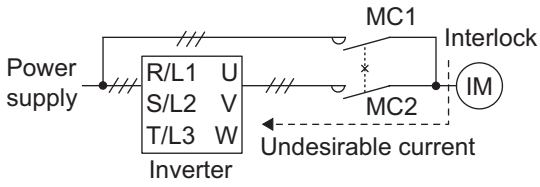

Twin contacts

5) Use shielded or twisted cables for connection to the control circuit terminals and run them away from the main and power circuits (including the 200V relay sequence circuit).
6) Do not apply a voltage to the contact input terminals (e.g. STF) of the control circuit.
7) Always apply a voltage to the fault output terminals (A, B, C) via a relay coil, lamp, etc.

4 PRECAUTIONS FOR USE OF THE INVERTER

The FR-F700 series is a highly reliable product, but incorrect peripheral circuit making or operation/handling method may shorten the product life or damage the product. Before starting operation, always recheck the following items.

(1) Use crimping terminals with insulation sleeve to wire the power supply and motor.
(2) Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.
(3) After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
(4) Use cables of the size to make a voltage drop 2% or less.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency. Refer to *page 8* for the recommended cable sizes.
(5) The overall wiring length should be 500m (1640.4 feet) maximum.
Especially for long distance wiring, the fast response current limit function may decrease or the equipment connected to the secondary side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring. Therefore, note the overall wiring length. *(Refer to page 10.)*
(6) Electromagnetic wave interference
The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. In this case, set the EMC filter valid to minimize interference.
(7) Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the inverter output side.
This will cause the inverter to trip or the capacitor, varistor, or arrester to be damaged. If any of the above devices is installed, immediately remove it.
(8) For some short time after the power is switched OFF, a high voltage remains in the smoothing capacitor. When accessing the inverter for inspection, wait for at least 10 minutes after the power supply has been switched OFF, and then make sure that the voltage across the main circuit terminals P/+ and N/- of the inverter is not more than 30VDC using a tester, etc.
(9) A short circuit or ground fault on the inverter output side may damage the inverter modules.
· Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or a ground fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
· Fully check the to-ground insulation and phase to phase insulation of the inverter output side before power-ON. Especially for an old motor or use in hostile atmosphere, securely check the motor insulation resistance etc.
(10) Do not use the inverter input side magnetic contactor to start/stop the inverter.
Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter.
(11) Do not apply a voltage higher than the permissible voltage to the inverter I/O signal circuits.
Application of permissible voltage to the inverter I/O signal circuit and incorrect polarity may damage the I/O terminal. Especially check the wiring to prevent the speed setting potentiometer from being connected incorrectly to short terminals 10E and 5.
(12) Provide electrical and mechanical interlocks for MC1 and MC2 which are used for bypass operation.
When the wiring is incorrect and if there is a bypass operation circuit as shown right, the inverter will be damaged when the power supply is connected to the inverter U, V, W terminals, due to arcs generated at the time of switch-over or chattering caused by a sequence error.



(13) If the machine must not be restarted when power is restored after a power failure, provide a magnetic contactor in the inverter's input side and also make up a sequence which will not switch on the start signal.
If the start signal (start switch) remains on after a power failure, the inverter will automatically restart as soon as the power is restored.
(14) Instructions for overload operation
When performing operation of frequent start/stop of the inverter, increase/decrease in the temperature of the transistor element of the inverter may repeat due to a continuous flow of large current, shortening the life from thermal fatigue. Since thermal fatigue is related to the amount of current, the life can be increased by reducing bound current, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Therefore, increase the inverter capacity to have enough allowance for current.
(15) Make sure that the specifications and rating match the system requirements.
(16) If electromagnetic noise generated from the inverter causes frequency setting signal to fluctuate and motor rotation speed to be unstable when changing motor speed with analog signal, the following countermeasures are effective.
· Do not run the signal cables and power cables (inverter I/O cables) in parallel with each other and do not bundle them.
· Run signal cables as far away as possible from power cables (inverter I/O cables).
· Use shield cables as signal cables.
· Install a ferrite core on the signal cable (Example: ZCAT3035-1330 TDK).

5 FAILSAFE OF THE SYSTEM WHICH USES THE INVERTER

When a fault occurs, the inverter trips to output a fault signal. However, a fault output signal may not be output at an inverter fault occurrence when the detection circuit or output circuit fails, etc. Although we assure best quality products, provide an interlock which uses inverter status output signals to prevent accidents such as damage to machine when the inverter fails for some reason and at the same time consider the system configuration where failsafe from outside the inverter, without using the inverter, is enabled even if the inverter fails.

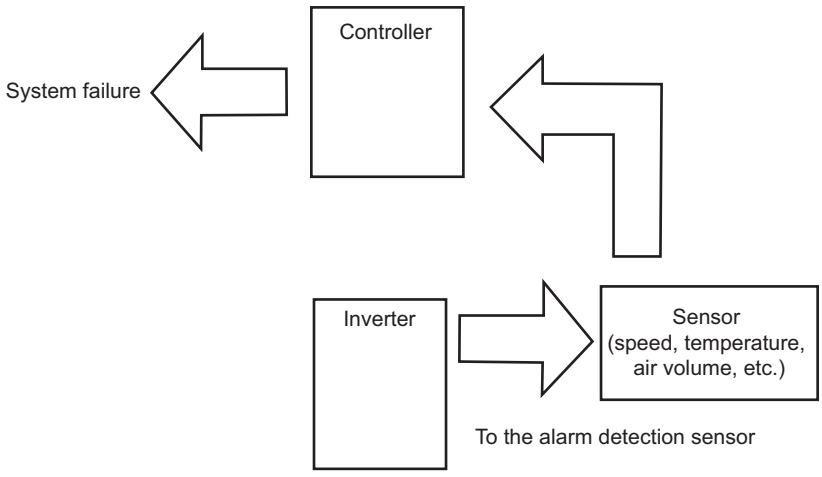
(1) Interlock method which uses the inverter status output signals
By combining the inverter status output signals to provide an interlock as shown below, an inverter alarm can be detected.

No	Interlock Method	Check Method	Used Signals	Refer to Page
1)	Inverter protective function operation	Operation check of an alarm contact Circuit error detection by negative logic	Fault output signal (ALM signal)	*Refer to the chapter 4 of the Instruction Manual.*
2)	Inverter running status	Operation ready signal check	Operation ready signal (RY signal)	*Refer to the chapter 4 of the Instruction Manual.*
3)	Inverter running status	Logic check of the start signal and running signal	Start signal (STF signal, STR signal) Running signal (RUN signal)	*Refer to the chapter 4 of the Instruction Manual.*
4)	Inverter running status	Logic check of the start signal and output current	Start signal (STF signal, STR signal) Output current detection signal (Y12 signal)	*Refer to the chapter 4 of the Instruction Manual.*

(2) Backup method outside the inverter
Even if the interlock is provided by the inverter status signal, enough failsafe is not ensured depending on the failure status of the inverter itself. For example, when the inverter CPU fails, even if the interlock is provided using the inverter fault signal, start signal and RUN signal, there is a case where a fault signal is not output and RUN signal is kept output even if an inverter fault occurs.
Provide a speed detector to detect the motor speed and current detector to detect the motor current and consider the backup system such as checking up as below according to the level of importance of the system.

1) Start signal and actual operation check
Check the motor running and motor current while the start signal is input to the inverter by comparing the start signal to the inverter and detected speed of the speed detector or detected current of the current detector. Note that the motor current runs as the motor is running for the period until the motor stops since the inverter starts decelerating even if the start signal turns off. For the logic check, configure a sequence considering the inverter deceleration time. In addition, it is recommended to check the three-phase current when using the current detector.

2) Command speed and actual operation check
Check if there is no gap between the actual speed and commanded speed by comparing the inverter speed command and detected speed of the speed detector.



6 PARAMETER LIST

6.1 Parameter list

In the initial setting, only the simple mode parameters are displayed.
Set *Pr. 160 User group read selection* as required.

Parameter	Name	Initial Value	Setting Range	Remarks
160	User group read selection	0	9999	Only the simple mode parameters can be displayed.
			0	Simple mode and extended mode parameters can be displayed.
			1	Only the parameters registered in the user group can be displayed.

REMARKS

- The parameters marked ◎ are the simple mode parameters.
- The parameters marked with in the table allow its setting to be changed during operation even if "0" (initial value) is set in *Pr. 77 Parameter write selection*.

Parameters	Name	Setting Range	Initial Value
◎ 0	Torque boost	0 to 30%	6/4/3/2/ 1.5/1% *1
◎ 1	Maximum frequency	0 to 120Hz	120/60Hz *2
◎ 2	Minimum frequency	0 to 120Hz	0Hz
◎ 3	Base frequency	0 to 400Hz	60Hz
◎ 4	Multi-speed setting (high speed)	0 to 400Hz	60Hz
◎ 5	Multi-speed setting (middle speed)	0 to 400Hz	30Hz
◎ 6	Multi-speed setting (low speed)	0 to 400Hz	10Hz
◎ 7	Acceleration time	0 to 3600/360s	5s/15s *3
◎ 8	Deceleration time	0 to 3600/360s	10s/30s *3
◎ 9	Electronic thermal O/ L relay	0 to 500/ 0 to 3600A *2	Rated inverter current
10	DC injection brake operation frequency	0 to 120Hz, 9999	3Hz
11	DC injection brake operation time	0 to 10s, 8888	0.5s
12	DC injection brake operation voltage	0 to 30%	4/2/1% *4
13	Starting frequency	0 to 60Hz	0.5Hz
14	Load pattern selection	0, 1	1
15	Jog frequency	0 to 400Hz	5Hz
16	Jog acceleration/ deceleration time	0 to 3600/360s	0.5s
17	MRS input selection	0, 2	0
18	High speed maximum frequency	120 to 400Hz	120/60Hz *2
19	Base frequency voltage	0 to 1000V, 8888, 9999	9999
20	Acceleration/ deceleration reference frequency	1 to 400Hz	60Hz

Parameters	Name	Setting Range	Initial Value
21	Acceleration/ deceleration time increments	0, 1	0
22	Stall prevention operation level	0 to 120%, 9999	110%
23	Stall prevention operation level compensation factor at double speed	0 to 150%, 9999	9999
24 to 27	Multi-speed setting (4 speed to 7 speed)	0 to 400Hz, 9999	9999
28	Multi-speed input compensation selection	0, 1	0
29	Acceleration/ deceleration pattern selection	0, 1, 2, 3, 6	0
30	Regenerative function selection	0, 2, 10, 20, 100, 120/ 0, 1, 2, 10, 11, 20, 21, 100, 101, 120, 121 *2	0
31	Frequency jump 1A	0 to 400Hz, 9999	9999
32	Frequency jump 1B	0 to 400Hz, 9999	9999
33	Frequency jump 2A	0 to 400Hz, 9999	9999
34	Frequency jump 2B	0 to 400Hz, 9999	9999
35	Frequency jump 3A	0 to 400Hz, 9999	9999
36	Frequency jump 3B	0 to 400Hz, 9999	9999
37	Speed display	0, 1 to 9998	0
41	Up-to-frequency sensitivity	0 to 100%	10%
42	Output frequency detection	0 to 400Hz	6Hz

Parameters	Name	Setting Range	Initial Value
43	Output frequency detection for reverse rotation	0 to 400Hz, 9999	9999
44	Second acceleration/ deceleration time	0 to 3600/360s	5s
45	Second deceleration time	0 to 3600/360s, 9999	9999
46	Second torque boost	0 to 30%, 9999	9999
47	Second V/F (base frequency)	0 to 400Hz, 9999	9999
48	Second stall prevention operation current	0 to 120%	110%
49	Second stall prevention operation frequency	0 to 400Hz, 9999	0Hz
50	Second output frequency detection	0 to 400Hz	30Hz
51	Second electronic thermal O/L relay	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
52	DU/PU main display data selection	0, 5, 6, 8 to 14, 17, 20, 23 to 25, 50 to 57, 100 *7	0
54	CA terminal function selection	1 to 3, 5, 6, 8 to 14, 17, 21, 24, 50, 52, 53, 70 *7	1
55	Frequency monitoring reference	0 to 400Hz	60Hz
56	Current monitoring reference	0 to 500A/ 0 to 3600A *2	Rated inverter current
57	Restart coasting time	0, 0.1 to 5s, 9999/ 0, 0.1 to 30s, 9999 *2	9999
58	Restart cushion time	0 to 60s	1s
59	Remote function selection	0, 1, 2, 3, 11, 12, 13	0
◎ 60	Energy saving control selection	0, 4, 9	0
65	Retry selection	0 to 5	0
66	Stall prevention operation reduction starting frequency	0 to 400Hz	60Hz
67	Number of retries at fault occurrence	0, 1 to 10, 101 to 110	0
68	Retry waiting time	0 to 10s	1s
69	Retry count display erase	0	0
70	Special regenerative brake duty *8	0 to 10%	0%
71	Applied motor	0, 1, 2, 20	0
72	PWM frequency selection	0 to 15/ 0 to 6, 25 *2	2
73	Analog input selection	0 to 7, 10 to 17	1
74	Input filter time constant	0 to 8	1

Parameters	Name	Setting Range	Initial Value
75	Reset selection/ disconnected PU detection/PU stop selection	0 to 3, 14 to 17, 100 to 103, 114 to 117 *9	14
76	Fault code output selection	0, 1, 2	0
77	Parameter write selection	0, 1, 2	0
78	Reverse rotation prevention selection	0, 1, 2	0
◎ 79	Operation mode selection	0, 1, 2, 3, 4, 6, 7	0
80	Motor capacity	0.4 to 55kW, 9999/ 0 to 3600kW, 9999 *2	9999
90	Motor constant (R1)	0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2	9999
100	V/F1(first frequency)	0 to 400Hz, 9999	9999
101	V/F1(first frequency voltage)	0 to 1000V	0V
102	V/F2(second frequency)	0 to 400Hz, 9999	9999
103	V/F2(second frequency voltage)	0 to 1000V	0V
104	V/F3(third frequency)	0 to 400Hz, 9999	9999
105	V/F3(third frequency voltage)	0 to 1000V	0V
106	V/F4(fourth frequency)	0 to 400Hz, 9999	9999
107	V/F4(fourth frequency voltage)	0 to 1000V	0V
108	V/F5(fifth frequency)	0 to 400Hz, 9999	9999
109	V/F5(fifth frequency voltage)	0 to 1000V	0V
117	PU communication station number	0 to 31	0
118	PU communication speed	48, 96, 192, 384	192
119	PU communication stop bit length	0, 1, 10, 11	1
120	PU communication parity check	0, 1, 2	2
121	Number of PU communication retries	0 to 10, 9999	1
122	PU communication check time interval	0, 0.1 to 999.8s, 9999	9999
123	PU communication waiting time setting	0 to 150ms, 9999	9999
124	PU communication CR/LF selection	0, 1, 2	1
◎ 125	Terminal 2 frequency setting gain frequency	0 to 400Hz	60Hz
◎ 126	Terminal 4 frequency setting gain frequency	0 to 400Hz	60Hz

Parameters	Name	Setting Range	Initial Value
127	PID control automatic switchover frequency	0 to 400Hz, 9999	9999
128	PID action selection	10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 110, 111, 120, 121	10
129	PID proportional band	0.1 to 1000%, 9999	100%
130	PID integral time	0.1 to 3600s, 9999	1s
131	PID upper limit	0 to 100%, 9999	9999
132	PID lower limit	0 to 100%, 9999	9999
133	PID action set point	0 to 100%, 9999	9999
134	PID differential time	0.01 to 10.00s, 9999	9999
135	Electronic bypass sequence selection	0, 1	0
136	MC switchover interlock time	0 to 100s	1s
137	Start waiting time	0 to 100s	0.5s
138	Bypass selection at a fault	0, 1	0
139	Automatic switchover frequency from inverter to bypass operation	0 to 60Hz, 9999	9999
140	Backlash acceleration stopping frequency	0 to 400Hz	1Hz
141	Backlash acceleration stopping time	0 to 360s	0.5s
142	Backlash deceleration stopping frequency	0 to 400Hz	1Hz
143	Backlash deceleration stopping time	0 to 360s	0.5s
144	Speed setting switchover	0, 2, 4, 6, 8, 10, 102, 104, 106, 108, 110	4
145	PU display language selection	0 to 7	1
147	Acceleration/ deceleration time switching frequency	0 to 400Hz, 9999	9999
148	Stall prevention level at 0V input	0 to 120%	110%
149	Stall prevention level at 10V input	0 to 120%	120%
150	Output current detection level	0 to 120%	110%
151	Output current detection signal delay time	0 to 10s	0s
152	Zero current detection level	0 to 150%	5%

Parameters	Name	Setting Range	Initial Value
153	Zero current detection time	0 to 10s	0.5s
154	Voltage reduction selection during stall prevention operation	0, 1	1
155	RT signal function validity condition selection	0, 10	0
156	Stall prevention operation selection	0 to 31, 100, 101	0
157	OL signal output timer	0 to 25s, 9999	0s
158	AM terminal function selection	1 to 3, 5, 6, 8 to 14, 17, 21, 24, 50, 52, 53, 70 *7	1
159	Automatic switchover frequency range from bypass to inverter operation	0 to 10Hz, 9999	9999
◎160	User group read selection	0, 1, 9999	0
161	Frequency setting/ key lock operation selection	0, 1, 10, 11	0
162	Automatic restart after instantaneous power failure selection	0, 1, 10, 11	0
163	First cushion time for restart	0 to 20s	0s
164	First cushion voltage for restart	0 to 100%	0%
165	Stall prevention operation level for restart	0 to 120%	110%
166	Output current detection signal retention time	0 to 10s, 9999	0.1s
167	Output current detection operation selection	0, 1, 10, 11	0
168	Parameter for manufacturer setting. Do not set.		
169			
170	Watt-hour meter clear	0, 10, 9999	9999
171	Operation hour meter clear	0, 9999	9999
172	User group registered display/ batch clear	9999, (0 to 16)	0
173	User group registration	0 to 999, 9999	9999
174	User group clear	0 to 999, 9999	9999
178	STF terminal function selection	0 to 8, 10 to 14, 16, 24, 25, 50, 51, 60, 62, 64 to 67, 70 to 72, 77, 78, 9999	60

Parameters	Name	Setting Range	Initial Value
179	STR terminal function selection	0 to 8, 10 to 14, 16, 24, 25, 50, 51, 61, 62, 64 to 67, 70 to 72, 77, 78, 9999	61
180	RL terminal function selection	0 to 8, 10 to 14, 16, 24, 25, 50, 51, 62, 64 to 67, 70 to 72, 77, 78, 9999	0
181	RM terminal function selection		1
182	RH terminal function selection		2
183	RT terminal function selection		3
184	AU terminal function selection	0 to 8, 10 to 14, 16, 24, 25, 50, 51, 62 to 67, 70 to 72, 77, 78, 9999	4
185	JOG terminal function selection	0 to 8, 10 to 14, 16, 24, 25, 50, 51, 62, 64 to 67, 70 to 72, 77, 78, 9999	5
186	CS terminal function selection		6
187	MRS terminal function selection		24
188	STOP terminal function selection		25
189	RES terminal function selection		62
190	RUN terminal function selection	0 to 5, 7, 8, 10 to 19, 25, 26, 45 to 54, 64, 67, 70 to 79, 85, 90 to 96, 98, 99, 100 to 105, 107, 108, 110 to 116, 125, 126, 145 to 154, 164, 167, 170 to 179, 185, 190 to 196, 198, 199, 9999 *10	0
191	SU terminal function selection		1
192	IPF terminal function selection		2
193	OL terminal function selection		3
194	FU terminal function selection		4
195	ABC1 terminal function selection	0 to 5, 7, 8, 10 to 19, 25, 26, 45 to 54, 64, 67, 70 to 79, 85, 90, 91, 94 to 96, 98, 99,100 to 105, 107, 108, 110 to 116, 125, 126, 145 to 154, 164, 167, 170 to 179, 185, 190, 191, 194 to 196,198, 199, 9999 *10	99
196	ABC2 terminal function selection		9999
232 to 239	Multi-speed setting (8 speed to 15 speed)	0 to 400Hz, 9999	9999
240	Soft-PWM operation selection	0, 1	1
241	Analog input display unit switchover	0, 1	0

Parameters	Name	Setting Range	Initial Value
242	Terminal 1 added compensation amount (terminal 2)	0 to 100%	100%
243	Terminal 1 added compensation amount (terminal 4)	0 to 100%	75%
244	Cooling fan operation selection	0, 1	1
245	Rated slip	0 to 50%, 9999	9999
246	Slip compensation time constant	0.01 to 10s	0.5s
247	Constant-power range slip compensation selection	0, 9999	9999
250	Stop selection	0 to 100s, 1000 to 1100s, 8888, 9999	9999
251	Output phase loss protection selection	0, 1	1
252	Override bias	0 to 200%	50%
253	Override gain	0 to 200%	150%
255	Life alarm status display	(0 to 15)	0
256	Inrush current limit circuit life display	(0 to 100%)	100%
257	Control circuit capacitor life display	(0 to 100%)	100%
258	Main circuit capacitor life display	(0 to 100%)	100%
259	Main circuit capacitor life measuring	0, 1	0
260	PWM frequency automatic switchover	0, 1	1
261	Power failure stop selection	0, 1, 2, 21, 22	0
262	Subtracted frequency at deceleration start	0 to 20Hz	3Hz
263	Subtraction starting frequency	0 to 400Hz, 9999	60Hz
264	Power-failure deceleration time 1	0 to 3600/ 360s	5s
265	Power-failure deceleration time 2	0 to 3600/ 360s, 9999	9999
266	Power failure deceleration time switchover frequency	0 to 400Hz	60Hz
267	Terminal 4 input selection	0, 1, 2	0
268	Monitor decimal digits selection	0, 1, 9999	9999
269	Parameter for manufacturer setting. Do not set.		
296	Password lock level	0 to 6, 99, 100 to 106, 199, 9999	9999
297	Password lock/ unlock	(0 to 5), 1000 to 9998, 9999	9999

Parameters	Name	Setting Range	Initial Value
299	Rotation direction detection selection at restarting	0, 1, 9999	9999
331	RS-485 communication station number	0 to 31 (0 to 247)	0
332	RS-485 communication speed	3, 6, 12, 24, 48, 96, 192, 384	96
333	RS-485 communication stop bit length	0, 1, 10, 11	1
334	RS-485 communication parity check selection	0, 1, 2	2
335	RS-485 communication retry count	0 to 10, 9999	1
336	RS-485 communication check time interval	0 to 999.8s, 9999	0s
337	RS-485 communication waiting time setting	0 to 150ms, 9999	9999
338	Communication operation command source	0, 1	0
339	Communication speed command source	0, 1, 2	0
340	Communication startup mode selection	0, 1, 2, 10, 12	0
341	RS-485 communication CR/LF selection	0, 1, 2	1
342	Communication EEPROM write selection	0, 1	0
343	Communication error count	—	0
414	PLC function operation selection	0, 1	0
415	Inverter operation lock mode setting	0, 1	0
495	Remote output selection	0, 1, 10, 11	0
496	Remote output data 1	0 to 4095	0
497	Remote output data 2	0 to 4095	0
498	PLC function flash memory clear	0 to 9999	0
502	Stop mode selection at communication error	0 to 3	0
503	Maintenance timer	0 (1 to 9998)	0
504	Maintenance timer alarm output set time	0 to 9998, 9999	9999
505	Speed setting reference	1 to 120Hz	60Hz
506 to 515	Parameter 1 to 10 for user	0 to 65535	0
522	Output stop frequency	0 to 400Hz, 9999	9999

Parameters	Name	Setting Range	Initial Value
539	Modbus-RTU communication check time interval	0 to 999.8s, 9999	9999
549	Protocol selection	0, 1	1
550	NET mode operation command source selection	0, 1, 9999	9999
551	PU mode operation command source selection	1, 2	2
553	PID deviation limit	0 to 100.0%, 9999	9999
554	PID signal operation selection	0 to 3, 10 to 13	0
555	Current average time	0.1 to 1.0s	1s
556	Data output mask time	0.0 to 20.0s	0s
557	Current average value monitor signal output reference current	0 to 500A/ 0 to 3600A *2	Rated inverter current
563	Energization time carrying-over times	(0 to 65535)	0
564	Operating time carrying-over times	(0 to 65535)	0
570	Multiple rating setting	0, 1	0
571	Holding time at a start	0.0 to 10.0s, 9999	9999
573	4mA input check selection	1, 2, 3, 4, 9999	9999
575	Output interruption detection time	0 to 3600s, 9999	1s
576	Output interruption detection level	0 to 400Hz	0Hz
577	Output interruption cancel level	900 to 1100%	1000%
578	Auxiliary motor operation selection	0 to 3	0
579	Motor connection function selection	0 to 3	0
580	MC switching interlock time	0 to 100s	1s
581	Start waiting time	0 to 100s	1s
582	Auxiliary motor connection-time deceleration time	0 to 3600/360s, 9999	1s
583	Auxiliary motor disconnection-time acceleration time	0 to 3600/360s, 9999	1s
584	Auxiliary motor 1 starting frequency	0 to 400Hz	60Hz
585	Auxiliary motor 2 starting frequency	0 to 400Hz	60Hz
586	Auxiliary motor 3 starting frequency	0 to 400Hz	60Hz
587	Auxiliary motor 1 stopping frequency	0 to 400Hz	0Hz
588	Auxiliary motor 2 stopping frequency	0 to 400Hz	0Hz
589	Auxiliary motor 3 stopping frequency	0 to 400Hz	0Hz
590	Auxiliary motor start detection time	0 to 3600s	5s

Parameters	Name	Setting Range	Initial Value
591	Auxiliary motor stop detection time	0 to 3600s	5s
611	Acceleration time at a restart	0 to 3600s, 9999	5/15s *2
653	Speed smoothing control	0 to 200%	0
654	Speed smoothing cutoff frequency	0 to 120Hz	20Hz
665	Regeneration avoidance frequency gain	0 to 200%	100%
753	Second PID action selection	10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 110, 111, 120, 121, 9999	9999
754	Second PID control automatic switchover frequency	0 to 400Hz, 9999	9999
755	Second PID action set point	0 to 100%, 9999	9999
756	Second PID proportional band	0.1 to 1000%, 9999	100%
757	Second PID integral time	0.1 to 3600s, 9999	1s
758	Second PID differential time	0.01 to 10.00s, 9999	9999
759	PID unit selection	0 to 43, 9999	9999
760	Pre-charge fault selection	0, 1	0
761	Pre-charge ending level	0 to 100%, 9999	9999
762	Pre-charge ending time	0 to 3600s, 9999	9999
763	Pre-charge upper detection level	0 to 100%, 9999	9999
764	Pre-charge time limit	0 to 3600s, 9999	9999
765	Second pre-charge fault selection	0, 1	0
766	Second pre-charge ending level	0 to 100%, 9999	9999
767	Second pre-charge ending time	0 to 3600s, 9999	9999
768	Second pre-charge upper detection level	0 to 100%, 9999	9999
769	Second pre-charge time limit	0 to 3600s, 9999	9999
774	PU/DU monitor selection 1	1 to 3, 5, 6, 8 to 14, 17, 20, 23 to 25, 40 to 42, 50 to 57, 100, 9999 *7	9999
775	PU/DU monitor selection 2		9999
776	PU/DU monitor selection 3		9999
777	4mA input fault operation frequency	0 to 400Hz, 9999	9999
778	Current input check filter	0 to10s	0s

Parameters	Name	Setting Range	Initial Value
779	Operation frequency during communication error	0 to 400Hz, 9999	9999
799	Pulse increment setting for output power	0.1kWh, 1kWh, 10kWh, 100kWh, 1000kWh	1kWh
826 to 865	Parameter 11 to 50 for user	0 to 65535	0
867	AM output filter	0 to 5s	0.01s
869	Current output filter	0 to 5s	0.02s
870	Speed detection hysteresis	0 to 5Hz	0Hz
872	Input phase loss protection selection	0, 1	0
882	Regeneration avoidance operation selection	0, 1, 2	0
883	Regeneration avoidance operation level	300 to 800V	380VDC/ 760VDC
884	Regeneration avoidance at deceleration detection sensitivity	0 to 5	0
885	Regeneration avoidance compensation frequency limit value	0 to 30Hz, 9999	6Hz
886	Regeneration avoidance voltage gain	0 to 200%	100%
888	Free parameter 1	0 to 9999	9999
889	Free parameter 2	0 to 9999	9999
891	Cumulative power monitor digit shifted times	0 to 4, 9999	9999
892	Load factor	30 to 150%	100%
893	Energy saving monitor reference (motor capacity)	0.1 to 55kW/ 0 to 3600kW *2	LD/SLD value of applied motor capacity
894	Control selection during commercial power-supply operation	0, 1, 2, 3	0
895	Power saving rate reference value	0, 1, 9999	9999
896	Power unit cost	0 to 500, 9999	9999
897	Power saving monitor average time	0, 1 to 1000h, 9999	9999
898	Power saving cumulative monitor clear	0, 1, 10, 9999	9999
899	Operation time rate (estimated value)	0 to 100%, 9999	9999
C0 *6 (900)	CA terminal calibration	—	—
C1 *6 (901)	AM terminal calibration	—	—

Parameters	Name	Setting Range	Initial Value
C2 *6 (902)	Terminal 2 frequency setting bias frequency	0 to 400Hz	0Hz
C3 *6 (902)	Terminal 2 frequency setting bias	0 to 300%	0%
125 *6 (903)	Terminal 2 frequency setting gain frequency	0 to 400Hz	60Hz
C4 *6 (903)	Terminal 2 frequency setting gain	0 to 300%	100%
C5 *6 (904)	Terminal 4 frequency setting bias frequency	0 to 400Hz	0Hz
C6 *6 (904)	Terminal 4 frequency setting bias	0 to 300%	20%
126 *6 (905)	Terminal 4 frequency setting gain frequency	0 to 400Hz	60Hz
C7 *6 (905)	Terminal 4 frequency setting gain	0 to 300%	100%
C8 *6 (930)	Current output bias signal	0 to 100%	0%
C9 *6 (930)	Current output bias current	0 to 100%	0%
C10 *6 (931)	Current output gain signal	0 to 100%	100%
C11 *6 (931)	Current output gain current	0 to 100%	100%
◎ C42 *6 (934)	PID display bias coefficient	0 to 500.00, 9999	9999
◎ C43 *6 (934)	PID display bias analog value	0 to 300.0%	20%
◎ C44 *6 (935)	PID display gain coefficient	0 to 500.00, 9999	9999
◎ C45 *6 (935)	PID display gain analog value	0 to 300.0%	100%
989	Parameter copy alarm release	10/100 *2	10/100 *2
990	PU buzzer control	0, 1	1
991	PU contrast adjustment	0 to 63	58
997	Fault initiation	16 to 18, 32 to 34, 48, 49, 64, 80 to 82, 96, 112, 128, 129, 144, 145, 160, 161, 162, 164 to 168, 176 to 179, 192 to 194, 196 to 199, 228 to 230, 241, 242, 245 to 247, 253, 9999	9999
◎ 999	Automatic parameter setting	1, 2, 10, 11, 20, 21, 30, 31, 9999	9999
Pr.CL	Parameter clear	0, 1	0
ALLC	All parameter clear	0, 1	0
Er.CL	Faults history clear	0, 1	0

Parameters	Name	Setting Range	Initial Value
PCPY	Parameter copy	0, 1, 2, 3	0
Pr.CH	Initial value change list	—	—
AUTO	Automatic parameter setting	—	—

*1 Differ according to capacities.
6%: FR-F720-00046, FR-F740-00023
4%: FR-F720-00077 to 00167, FR-F740-00038 to 00083
3%: FR-F720-00250 and 00340, FR-F740-00126 and 00170
2%: FR-F720-00490 to 01540, FR-F740-00250 to 00770
1.5%: FR-F720-01870 and 02330, FR-F740-00930 and 01160
1%: FR-F720-03160 or more, FR-F740-01800 or more

*2 Differ according to capacities.
FR-F720-02330 or less / FR-F720-03160 or more
FR-F740-01160 or less / FR-F740-01800 or more

*3 Differ according to capacities.
FR-F720-00340 or less / FR-F720-00490 or more
FR-F740-00170 or less / FR-F740-00250 or more

*4 Differ according to capacities.
4%: FR-F720-00340 or less, FR-F740-00170 or less
2%: FR-F720-00490 to 02330, FR-F740-00250 to 01160
1%: FR-F720-03160 or more, FR-F740-01800 or more

*5 Differs according to the voltage class. (200V class/400V class).

*6 The parameter number in parentheses is the one for use with the parameter unit (FR-PU04/FR-PU07).

*7 Setting of "9" can be made for the FR-F720-03160 (FR-F740-01800) or more.

*8 Setting can be made for the FR-F720-03160 (FR-F740-01800) or more.

*9 Setting of "100 to 103", "114 to 117" can be made for the FR-F720-03160 (FR-F740-01800) or more.

*10 Setting of "7, 107" can be made for the FR-F720-03160 (FR-F740-01800) or more.

7 TROUBLESHOOTING

When a fault occurs in the inverter, the inverter trips and the PU display automatically changes to any of the following fault or alarm indications.
If the fault does not correspond to any of the following faults or if you have any other problem, please contact your sales representative.

- Retention of fault output signal ..... When the magnetic contactor (MC) provided on the input side of the inverter is opened when a fault occurs, the inverter's control power will be lost and the fault output will not be held.
- Fault or alarm indication ..... When a fault or alarm occurs, the operation panel display automatically switches to the fault or alarm indication.
- Resetting method ..... When a fault occurs, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart. *(Refer to page 20.)*
- When any fault occurs, take the appropriate corrective action, then reset the inverter, and resume operation. Not doing so may lead to the inverter fault and damage.

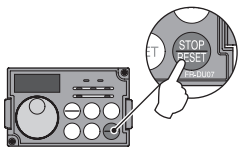
Inverter fault or alarm indications are roughly categorized as below.

(1) Error message
A message regarding operational fault and setting fault by the operation panel (FR-DU07) and parameter unit (FR-PU07/FR-PU04) is displayed. The inverter does not trip.
(2) Warnings
The inverter does not trip even when a warning is displayed. However, failure to take appropriate measures will lead to a fault.
(3) Alarm
The inverter does not trip. You can also output an alarm signal by making parameter setting.
(4) Fault
When a fault occurs, the inverter trips and a fault signal is output.

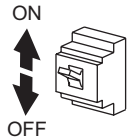
7.1 Reset method of protective function

The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter. Inverter recovers about 1s after the reset is released.

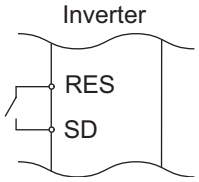
Operation 1: ..... Using the operation panel, press STOP RESET to reset the inverter.
(This may only be performed when a fault occurs *(Refer to the Instruction Manual (applied)* for fault.))



Operation 2:..... Switch power off once. After the indicator of the operation panel turns OFF, switch it ON again.



Operation 3: ..... Turn ON the reset signal (RES) for more than 0.1s. (If the RES signal is kept ON, "Err." appears (flickers) to indicate that the inverter is in a reset status.)



REMARKS

- When a fault occurs during PLC function, turning ON of X51 signal can release fault without interrupting PLC function. *(Refer to FR-F700 PLC function programming manual)*

7.2 List of fault or alarm display

Operation Panel Indication			Name	Fault Data Code
Error message	E - - -	E---	Faults history	-
	HOLd	HOLD	Operation panel lock	-
	LOCd	LOCd	Password locked	-
	Er1 to Er4	Er1 to 4	Parameter write error	-
	rE1 to rE4	rE1 to 4	Copy operation error	-
	Err.	Err.	Error	-
Warnings	OL	OL	Stall prevention (overcurrent)	-
	oL	oL	Stall prevention (overvoltage)	-
	rb	RB	Regenerative brake prealarm	-
	rH	TH	Electronic thermal relay function prealarm	-
	PS	PS	PU stop	-
	MT	MT	Maintenance signal output	-
	CP	CP	Parameter copy	-
Alarm	Fn	FN	Fan alarm	-
Fault	E.OC1	E.OC1	Overcurrent trip during acceleration	16 (H10)
	E.OC2	E.OC2	Overcurrent trip during constant speed	17 (H11)
	E.OC3	E.OC3	Overcurrent trip during deceleration or stop	18 (H12)
	E.OV1	E.OV1	Regenerative overvoltage trip during acceleration	32 (H20)
	E.OV2	E.OV2	Regenerative overvoltage trip during constant speed	33 (H21)
	E.OV3	E.OV3	Regenerative overvoltage trip during deceleration or stop	34 (H22)
	E.THT	E.THT	Inverter overload trip (electronic thermal relay function)	48 (H30)
	E.THM	E.THM	Motor overload trip (electronic thermal relay function)	49 (H31)
	E.FIN	E.FIN	Fin overheat	64 (H40)
	E.IPF	E.IPF	Instantaneous power failure	80 (H50)
	E.UVT	E.UVT	Undervoltage	81 (H51)

Operation Panel Indication			Name	Fault Data Code
Fault	E.ILF	E.ILF*	Input phase loss	82 (H52)
	E.OLT	E.OLT	Stall prevention stop	96 (H60)
	E.GF	E.GF	Output side ground fault overcurrent	128 (H80)
	E.LF	E.LF	Output phase loss	129 (H81)
	E.OHT	E.OHT	External thermal relay operation*2	144 (H90)
	E.PTC	E.PTC*	PTC thermistor operation	145 (H91)
	E.OPT	E.OPT	Option fault	160 (HA0)
	E.OP1 E.OP2	E.OP1 E.OP2	Communication option fault (e.g.communication error)	161 (HA1) 162 (HA2)
	E. 1 E. 2	E. 1 E. 2	Option fault (e.g.connection or contact fault)	241 (HF1) 242 (HF2)
	E. PE	E.PE	Parameter storage device fault	176 (HB0)
	E.PUE	E.PUE	PU disconnection	177 (HB1)
	E.rET	E.RET	Retry count excess	178 (HB2)
	E.PE2	E.PE2*	Parameter storage device fault	179 (HB3)
	E. 5 E. 6 E. 7 E.CPU	E. 5 E. 6 E. 7 E.CPU	CPU fault	245 (HF5) 246 (HF6) 247 (HF7) 192 (HC0)
	E.CTE	E.CTE	Operation panel power supply short circuit, RS-485 terminal power supply short circuit	193 (HC1)
	E.P24	E.P24	24VDC power output short circuit	194 (HC2)
	E.CDO	E.CDO*	Output current detection value exceeded	196 (HC4)
	E.IOH	E.IOH*	Inrush current limit circuit fault	197 (HC5)
	E.SER	E.SER*	Communication fault (inverter)	198 (HC6)
	E.AIE	E.AIE*	Analog input fault	199 (HC7)
	E.PID	E.PID*	PID signal fault	230 (HE6)
	E. bE	E.BE	Brake transistor alarm detection/internal circuit error	112 (H70)
	E. 13	E.13	Internal circuit fault	253 (HFD)
	E.PCH	E.PCH*	Pre-charge fault	229 (HE5)
	E.LCI	E.LCI*	4mA input fault	228 (HE4)

* If an error occurs when using the FR-PU04, "Fault 14" is displayed on the FR-PU04.

Appendix 1 Instructions for compliance with the EU Directives

The EU Directives are issued to standardize different national regulations of the EU Member States and to facilitate free movement of the equipment, whose safety is ensured, in the EU territory.
Since 1996, compliance with the EMC Directive that is one of the EU Directives has been legally required. Since 1997, compliance with the Low Voltage Directive, another EU Directive, has been also legally required. When a manufacturer confirms its equipment to be compliant with the EMC Directive and the Low Voltage Directive, the manufacturer must declare the conformity and affix the CE marking.

- **The authorized representative in the EU**

  The authorized representative in the EU is shown below.
  Name: Mitsubishi Electric Europe B.V.
  Address: Gothaer Strasse 8, 40880 Ratingen, Germany

- Note

  We declare that this inverter conforms with the EMC Directive in industrial environments and affix the CE marking on the inverter. When using the inverter in a residential area, take appropriate measures and ensure the conformity of the inverter used in the residential area.

(1) EMC Directive

We declare that this inverter conforms with the EMC Directive and affix the CE marking on the inverter.

- EMC Directive: 2004/108/EC
- Standard(s): EN61800-3:2004 (Second environment / PDS Category "C3")

Note: First environment

Environment including residential buildings. Includes buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.

Second environment

Environment including all buildings except buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.

- Note

Set the EMC filter valid and install the inverter and perform wiring according to the following instructions.

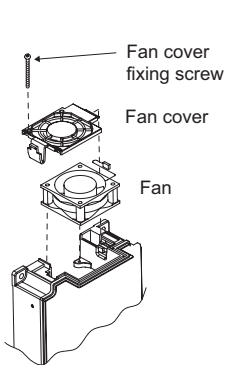
* The inverter is equipped with a built-in EMC filter. Set the EMC filter valid. (The EMC filter is invalid when shipped from the factory. (The FR-F720-00046 and 00077 are always valid.))
* Connect the inverter to an earthed power supply.
* Install a motor and a control cable according to the instructions written in the EMC Installation Guidelines (BCN-A21041-204).
* The cable length between the inverter and the motor is 5 m (16.4 feet) maximum.
* Confirm that the final integrated system with the inverter conforms with the EMC Directive.

(2) Low Voltage Directive

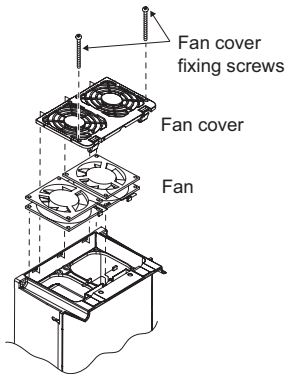
We have self-confirmed our inverters as products compliant to the Low Voltage Directive (Conforming standard EN 50178) and affix the CE mark on the inverters.

Outline of instructions

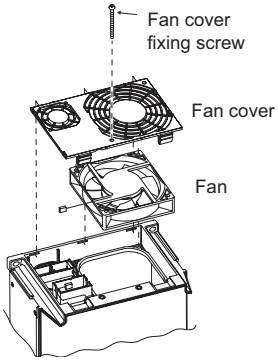
* Do not use an earth leakage current breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth securely.
* Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)
* Use the cable sizes on *page* 8 under the following conditions.
  · Surrounding air temperature: 40°C (104°F) maximum
  If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.
* Use a tinned (plating should not include zinc) crimping terminal to connect the ground cable. When tightening the screw, be careful not to damage the threads.
  For use as a product compliant with the Low Voltage Directive, use PVC cable whose size is indicated on *page* 8.
* Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.
* When using an earth leakage current breaker, use a residual current operated protective device (RCD) of type B (breaker which can detect both AC and DC). If not, provide double or reinforced insulation between the inverter and other equipment, or put a transformer between the main power supply and inverter.
* Use the inverter under the conditions of overvoltage category II (usable regardless of the ground condition of the power supply), overvoltage category III (usable with the earthed-neutral system power supply, 400V class only) and pollution degree 2 or lower specified in IEC664.
  · To use the inverter of 00770 or more (IP00) under the conditions of pollution degree 2, install it in the enclosure of IP 2X or higher.
  · To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.
  · To use the inverter of 00620 or less (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



FR-F720-00105 to 00250
FR-F740-00083, 00126



FR-F720-00340 to 00630
FR-F740-00170 to 00380



FR-F720-00770 to 01250
FR-F740-00470, 00620

* On the input and output of the inverter, use cables of the type and size set forth in EN60204 Appendix C.
* The operating capacity of the relay outputs (terminal symbols A1, B1, C1, A2, B2, C2) should be 30VDC, 0.3A. (Relay output has basic isolation from the inverter internal circuit.)
* Control circuit terminals on *page* 4 are safely isolated from the main circuit.
* Environment

	During Operation	In Storage	During Transportation
Surrounding air temperature	LD: -10°C to +50°C (14°F to 122°F) SLD (initial setting): -10°C to +40°C (14°F to 104°F)	-20°C to +65°C (-4°F to +149°F)	-20°C to +65°C (-4°F to +149°F)
Ambient humidity	90% RH or less	90% RH or less	90% RH or less
Maximum altitude	1000m (3280.80feet)	1000m (3280.80feet)	10000m (32808feet)

Details are given in the technical information "Low Voltage Directive Conformance Guide" (BCN-A21041-203). Please contact your sales representative.

Appendix 2 Instructions for UL and cUL Compliance

(Conforming standard UL 508C, CSA C22.2 No.14)

(1) Installation

This inverter is a UL / cUL Listed open type device for use inside an enclosure, or enclosed Type 1 device with a suitably rated enclosure.
For open type, design an enclosure so that the inverter surrounding air temperature, humidity and atmosphere satisfy the specifications. *(Refer to page 1.)*
The following UL / cUL Listed FR-F700 Series Inverters employ a UL Type 1 Enclosure - Suitable for Installation in a Compartment Handling Conditioned Air (Plenum):

Models FR-F720-00046, -00077, -00105, -00167, -00250, -00340, -00490, 00630, -00770, -00930, followed by -NA suffix.
Models FR-F740-00023, -00038, -00052, -00083, -00126, -00170, -00250, -00310, -00380, -00470, -00620, followed by -NA suffix.

Wiring protection

For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code and any applicable provincial codes.
For installation in Canada, branch circuit protection must be provided in accordance with the Canadian Electrical Code and any applicable provincial codes.
Provide the appropriate UL and cUL listed Class RK5, Class T or Class L type fuse or UL489 molded case circuit breaker (MCCB) that is suitable for branch circuit protection in accordance with the table below.
Note, the Class L fuses can be used if the applicable current rating is larger than 600A.

FR-F720-□□□□□-NA		00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330
Rated fuse voltage(V)		240V or more													
Fuse maximum allowable rating (A)*	Without power factor improving reactor	15	20	30	40	60	80	150	175	200	225	300	350	400	500
	With power factor improving reactor	15	20	20	30	50	70	125	150	200	200	250	300	350	400
Molded case circuit breaker (MCCB) maximum allowable rating (A)*		15	15	25	40	60	80	110	150	175	225	300	350	450	500

FR-F720-□□□□□-NA		03160	03800	04750
Rated fuse voltage(V)		240V or more		
Fuse maximum allowable rating (A)*	Without power factor improving reactor	—	—	—
	With power factor improving reactor	500	600	700
Molded case circuit breaker (MCCB) maximum allowable rating (A)*		700	900	1000

FR-F740-□□□□□-NA		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160
Rated fuse voltage(V)		480V or more													
Fuse maximum allowable rating (A)*	Without power factor improving reactor	6	10	15	20	30	40	70	80	90	110	150	175	200	250
	With power factor improving reactor	6	10	10	15	25	35	60	70	90	100	125	150	175	200
Molded case circuit breaker (MCCB) maximum allowable rating (A)*		15	15	15	20	30	40	60	70	90	100	150	175	225	250

FR-F740-□□□□□-NA		01800	02160	02600	03250	03610	04320	04810	05470	06100	06830	07700	08660	09620	10940	12120
Rated fuse voltage(V)		500V or more														
Fuse maximum allowable rating (A)*	Without power factor improving reactor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	With power factor improving reactor	300	350	400	500	600	700	800	900	1000	1100	1200	1350	1500	1800	2000
Molded case circuit breaker (MCCB) maximum allowable rating (A)*		450	500	600	800	900	1000	1200	1200	1200	1600	1600	2000	2000	2500	3000

* Maximum allowable rating by US National Electrical Code at SLD rating.
Exact size must be chosen for each installation.

(2) Wiring of the power supply and motor

For wiring the input (R/L1, S/L2, T/L3) and output (U, V, W) terminals of the inverter, use the UL Listed copper, stranded wires (rated at 75°C(167°F)) and round crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.

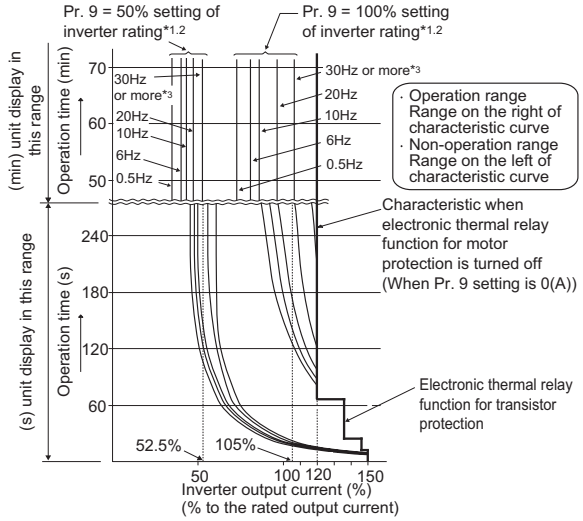
(3) Short circuit ratings

- 200V class
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 264V Maximum.
- 400V class
  Model 01160 or less
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 528V Maximum.
  Model 01800 or more
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 550V Maximum.

(4) Motor overload protection

This inverter is certified as a motor overload protection device by UL.
When using the electronic thermal relay function as motor overload protection, set the rated motor current to *Pr. 9 Electronic thermal O/L relay.*

Electronic thermal relay function operation characteristic



This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output. (The operation characteristic is shown on the left)

· When using the Mitsubishi constant-torque motor
  1) Set "1" in *Pr. 71*. (This provides a 100% continuous torque characteristic in the low-speed range.)
  2) Set the rated current of the motor in *Pr. 9*.

*1 When 50% of the inverter rated output current (current value) is set in *Pr. 9*

*2 The % value denotes the percentage to the inverter rated output current. It is not the percentage to the motor rated current.

*3 When you set the electronic thermal relay function dedicated to the Mitsubishi constant-torque motor, this characteristic curve applies to operation at 6Hz or higher.

CAUTION

- Protective function by electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-off.
- When multiple motors are operated by a single inverter, protection cannot be provided by the electronic thermal relay function. Install an external thermal relay to each motor.
- When the difference between the inverter and motor capacities is large and the setting is small, the protective characteristics of the electronic thermal relay function will be deteriorated. In this case, use an external thermal relay.
- A special motor cannot be protected by the electronic thermal relay function. Use the external thermal relay.
- Electronic thermal relay may not function when 5% or less of inverter rated current is set to electronic thermal relay setting.

MEMO

MEMO

MEMO

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Sep. 2004	IB(NA)-0600218ENG-A	First edition
Dec. 2004	IB(NA)-0600218ENG-B	Additions · FR-F720 - 03160 to 04750 - NA · FR-F740 - 04320 to 12120 - NA
May 2006	IB(NA)-0600218ENG-C	Additions · Electronic thermal relay function operation characteristic. · *Pr. 539 Modbus-RTU communication check time interval* · Voltage/current input switch
Nov. 2007	IB(NA)-0600218ENG-D	Additions · Breaker selection when using the inverter as UL or cUL listed product · *Pr. 495 Remote output selection* setting value "10, 11"
Sep. 2009	IB(NA)-0600218ENG-E	Additions · *Pr. 59 Remote function selection* setting value "11 ", "12 ", "13 " · *Pr. 29 Acceleration/deceleration pattern selection* setting value "6" · *Pr. 30 Regenerative function selection* setting value "10", "11", "20", "21" · *Pr.128 PID action selection* setting value "110", "111", "120", "121" · *Pr.167 Output current detection operation selection* setting value "10", "11" · *Pr.178 to Pr.189 Input terminal function selection* setting value "70", "71", "72" · *Pr.190 to Pr.196 Output terminal function selection* setting value "48", "79", "85", "148", "179", "185" · *Pr. 261 Power failure stop selection* setting value "21", "22" · *Pr.522 Output stop frequency* · *Pr.653 Speed smoothing control*, *Pr.654 Speed smoothing cutoff frequency* · *Pr.553 PID deviation limit*, *Pr.554 PID signal operation selection*, *C42 (Pr.934) PID display bias coefficient*, *C43 (Pr.934) PID display bias analog value*, *C44 (Pr.935) PID display gain coefficient*, *C45 (Pr.935) PID display gain analog value* · *Pr.799 Pulse increment setting for output power* Partial modification · *Pr.153 Zero current detection time* setting range "0 to 10s" · Appendix 1 Instructions for compliance with the EU Directives

May 2010	IB(NA)-0600218ENG-F	Additions
		· Two plug-in options available
		· *Pr. 147, Pr. 296, Pr. 297, Pr. 414, Pr. 415, Pr. 498, Pr. 502, Pr. 505 to Pr. 515, Pr. 665, Pr. 753 to Pr. 769, Pr. 774 to Pr. 779, Pr. 826 to Pr. 865, Pr. 870, Pr. 997, Pr. 999, Pr. CH, AUTO*
		· *Pr. 128 PID action selection* setting value "70 to 101"
		· *Pr. 30 Regenerative function selection* setting value "100, 101, 120, 121"
		· *Pr. 54 CA terminal function selection and Pr.158 AM terminal function selection* setting value "70"
		· *Pr. 178 to Pr. 189 (input terminal function selection)* setting value "50, 51, 77, 78"
		· *Pr. 190 to Pr. 196 (output terminal function selection)* setting value "49 to 54, 67, 149 to 154, 167"
		· *Pr. 573 4mA input check selection* setting value "2, 3, 4"
		· Error message
		  · LOCd Password locked
		  · E.OP2 Communication option fault
		  · E.2 Option fault
		  · E.PCH Pre-charge fault
		  · E.LCI 4mA input fault
		Partial modification
		· *Pr. 263 Subtraction starting frequency* setting range "0 to 120Hz, 9999" to "0 to 400Hz, 9999"
		· *Pr. 885 Regeneration avoidance compensation frequency limit value* setting range "0 to 10Hz, 9999" to "0 to 30Hz, 9999"

⚠ For Maximum Safety

- Mitsubishi inverters are not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to prevent serious accidents when it is used in facilities where breakdowns of the product are likely to cause a serious accident.
- Please do not use this product for loads other than three-phase induction motors.

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Warning: This is a personal computer dedicated CD-ROM. Do not attempt to play it on ordinary audio devices. The loud volume may damage hearing and speakers.

■ When playing this CD-ROM on Windows OS

♦ Operating environment
- The following system is required to read instruction manuals contained in this CD-ROM.

Item	Specifications
OS	Microsoft Windows 95 OSR 2.0, Windows 98 Second Edition, Windows Millennium Edition, Windows NT 4.0 with Service Pack 6, Windows 2000 with Service Pack 2, Windows XP Professional or Home Edition, Windows XP Tablet PC Edition
CPU	Intel Pentium processor
Memory	64MB of RAM
Hard disk	24MB of available hard-disk space
CD-ROM drive	Double speed or more (more than quadruple speed is recommended)
Monitor	800x600 dot or more
Application	Acrobat Reader 4.05 or more

♦ Operating method of this CD-ROM

How to read instruction manuals
Step 1. Start Windows and place this CD-ROM in the CD-ROM drive.
Step 2. "700 series documentation" PDF automatically opens.
Step 3. Click a PDF file name of the manual you want to read in the "INSTRUCTION MANUAL" list.
Step 4. PDF manual you clicked opens.

* Manual opening of this CD-ROM
Step 1. Start Windows and place this CD-ROM in the CD-ROM drive.
Step 2. Select a CD-ROM drive (example: D drive) of "My computer" and click the right mouse button. Then, click "open" in the context menu.
Step 3. Open "INDEX.PDF" in the opened folder.
Step 4. "700 series documentation" PDF opens. Operates according to the steps from "Step 3" of "How to read instruction manuals"

- PDF data of the instruction manual are stored in "MANUAL" folder on this CD-ROM.

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